



# Armed Forces College of Medicine

## AFCM





# Autonomic nerves of thorax

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# INTENDED LEARNING OBJECTIVES (ILO)



**By the end of this lecture the student will be able to:**

1. Describe the course and distribution of the vagus and thoracic part of sympathetic chain.
2. Discuss the formation and distribution of autonomic plexuses of thorax (cardiac and pulmonary).



# VAGI IN THE THORAX

New Five Year Program

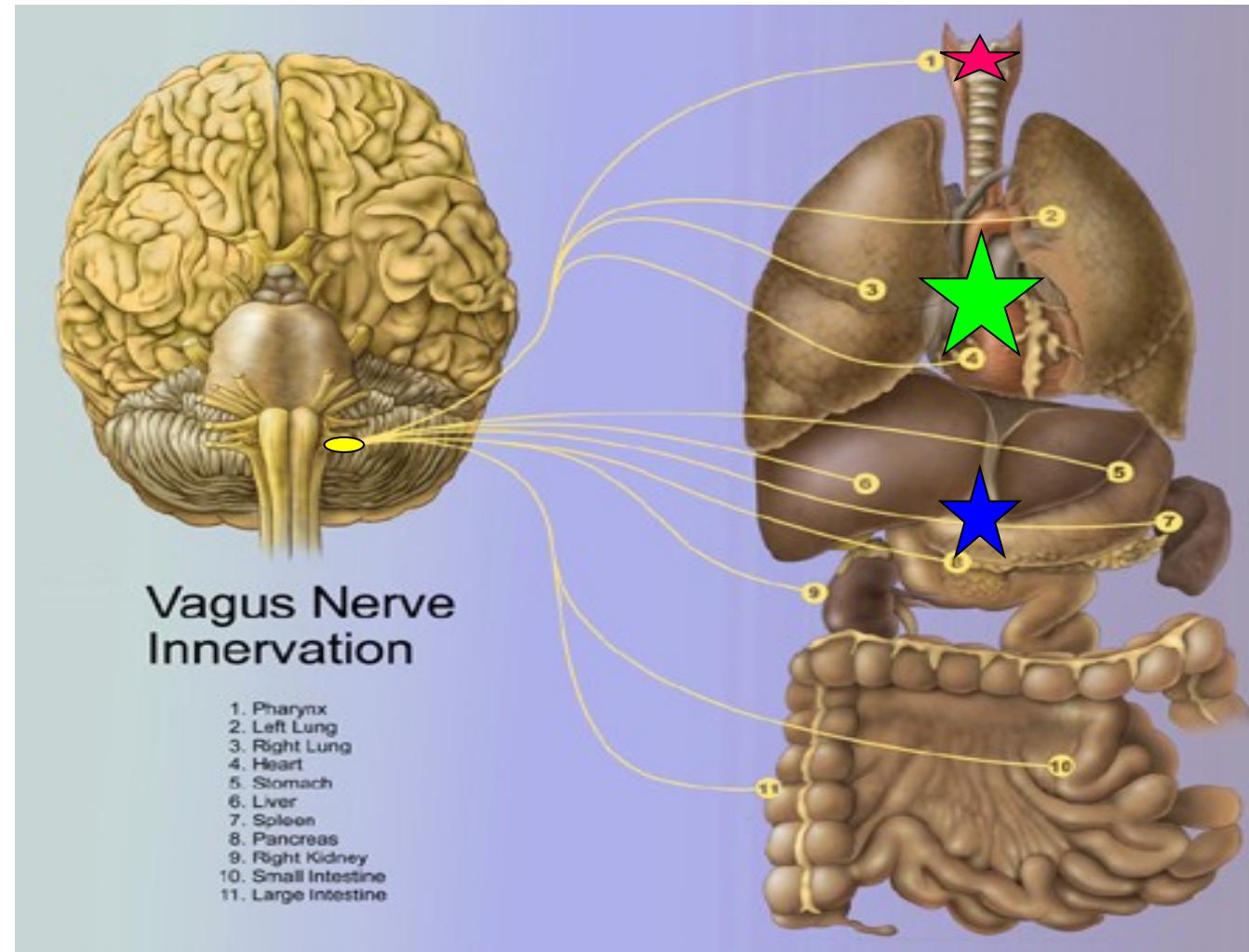
Cardio-pulmonary Module

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Hanna**



# The Vagi

- **Vagus is the 10<sup>th</sup> cranial nerve**
- **Origin : from medulla oblongata**
- **Course : has a long course in the neck, thorax & abdomen**
- **Only the thoracic part of the vagus is described here**



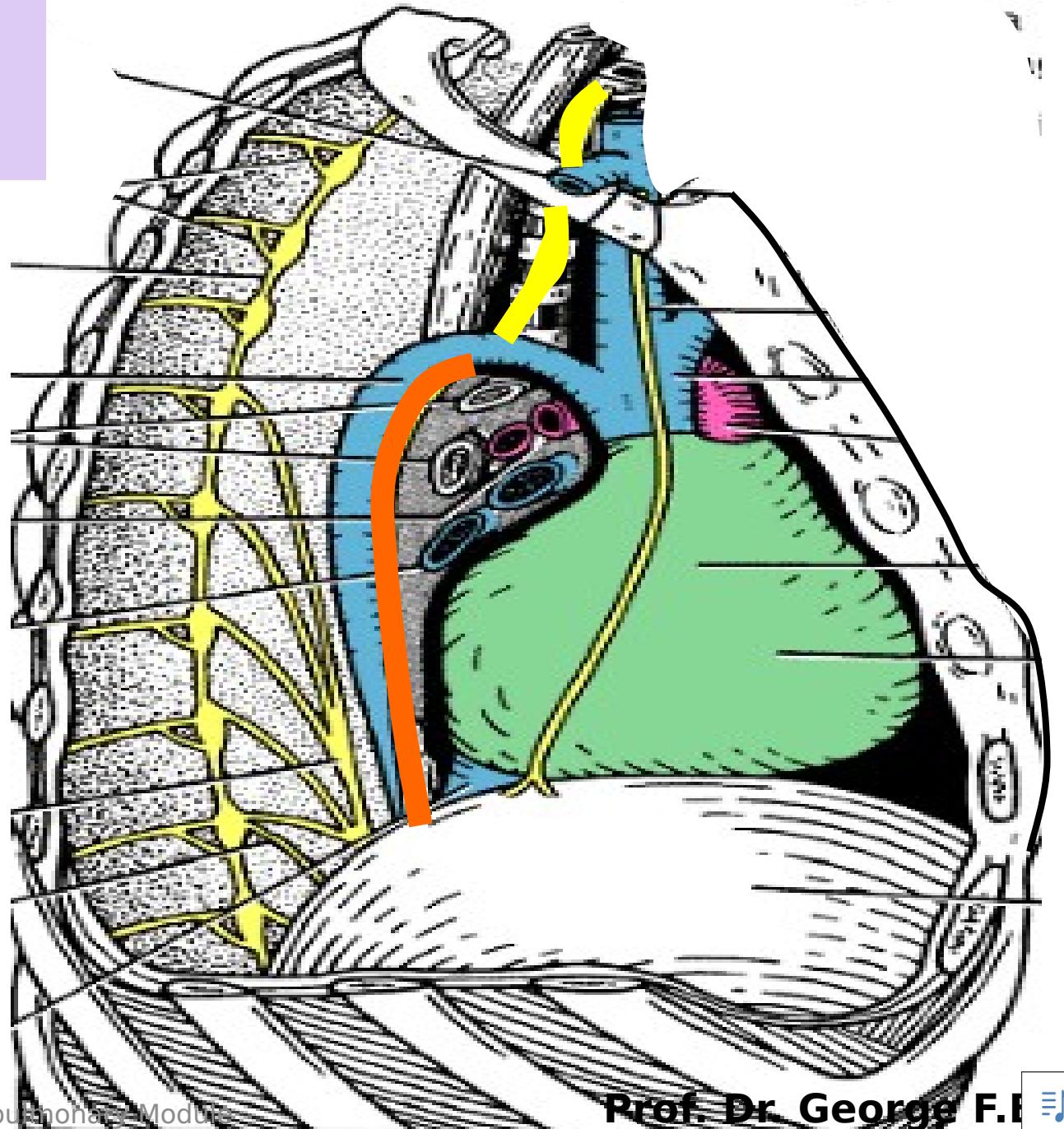
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# Course & relations of vagus nerve

- Vagus nerve descends first in the **superior mediastinum** → then in the **posterior mediastinum**

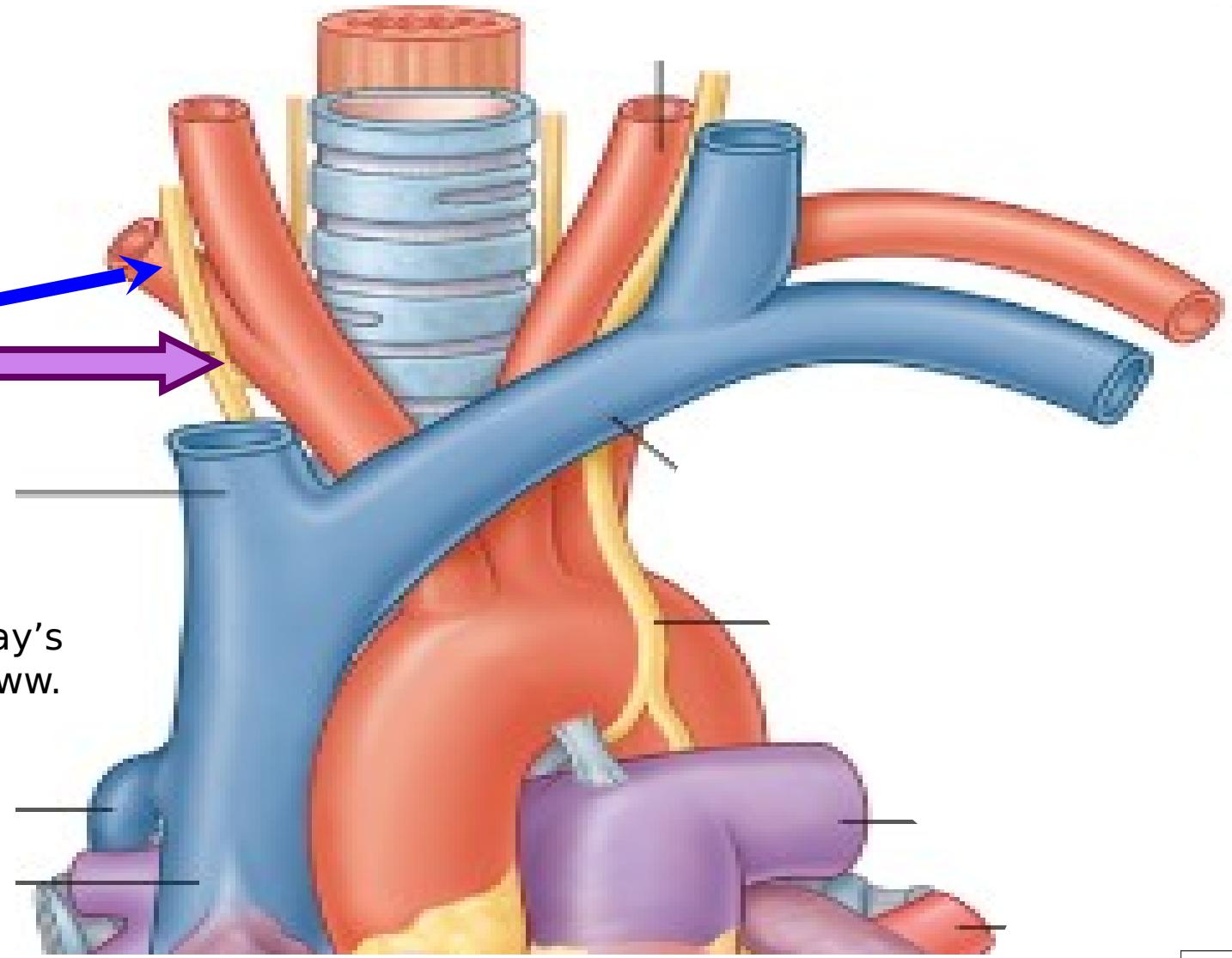
[web.duke.edu](http://web.duke.edu)



# Course & relations of vagus nerve

- The right vagus

Enters the thorax by crossing in front of the subclavian artery



Elsevier. Drake et al: Gray's anatomy for student- [www.studentconsult.com](http://www.studentconsult.com)



# Course of right vagus (cont)

- Right vagus descends behind **right brachiocephalic vein**
- Above root of Rt. Lung,  $\square$  descends on left side of **arch of azygos**
- Behind right bronchus *where it forms* **right post. pulmonary plexus**
- Behind **esophagus** *where it forms* **esophageal plexus**
- Passes through **esophageal opening** in **diaphragm**  $\square$  **post.** to the stomach, *therefore called* **posterior gastric nerve**



**Rt brachiocephalic vein**

**esophagus**

**Esophageal opening**

Arch of azygos

Br

**Right vagus**

**Rt Post Pulmonary plexus**

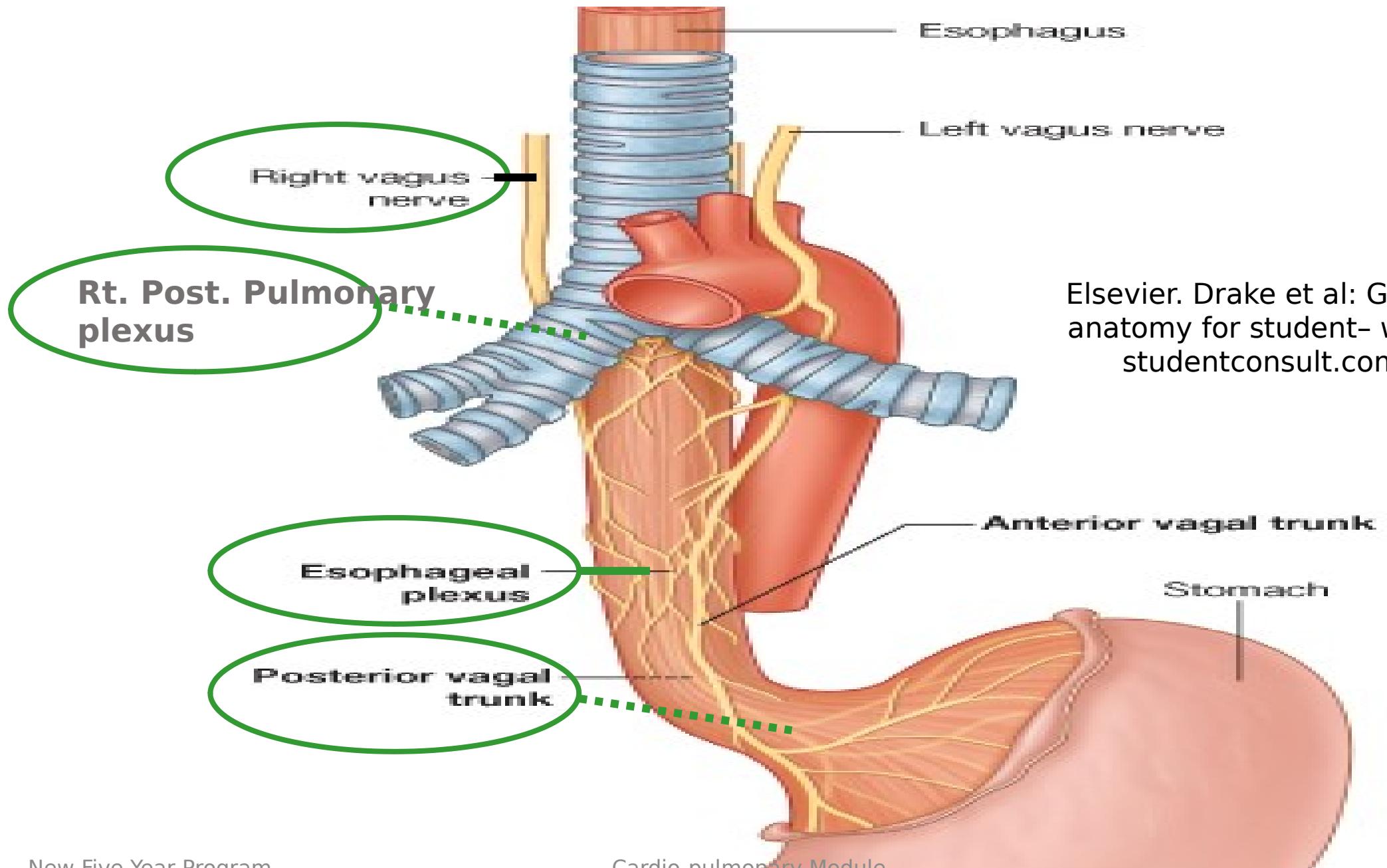
**Esophageal plexus**

Frank H. Netter, 4<sup>th</sup> ed.

**diaphragm**

**Post. Gastric n**

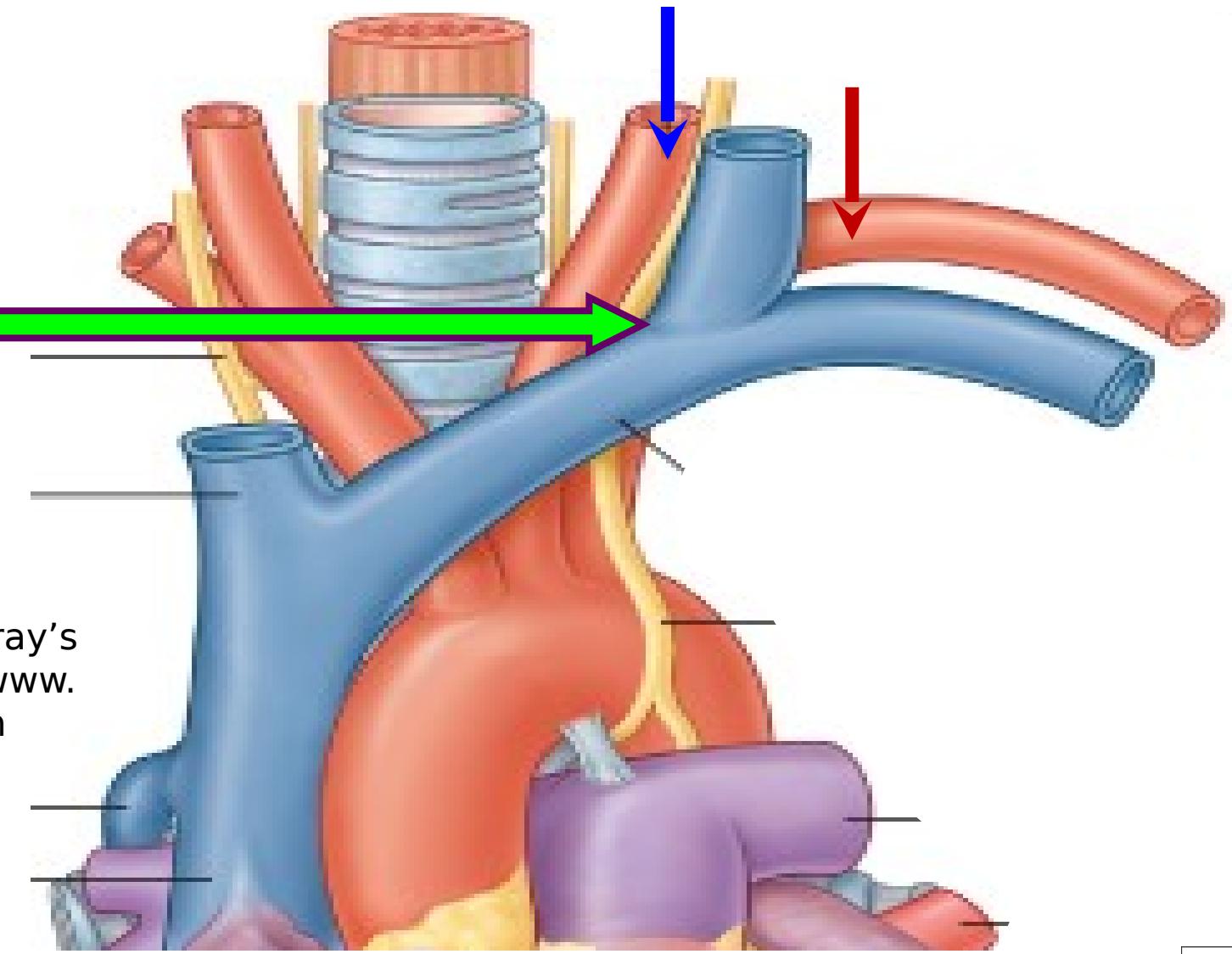
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# Course & relations of vagus nerve

- The left vagus :

Enters the thorax by passing between **left common carotid** & **left subclavian arteries**

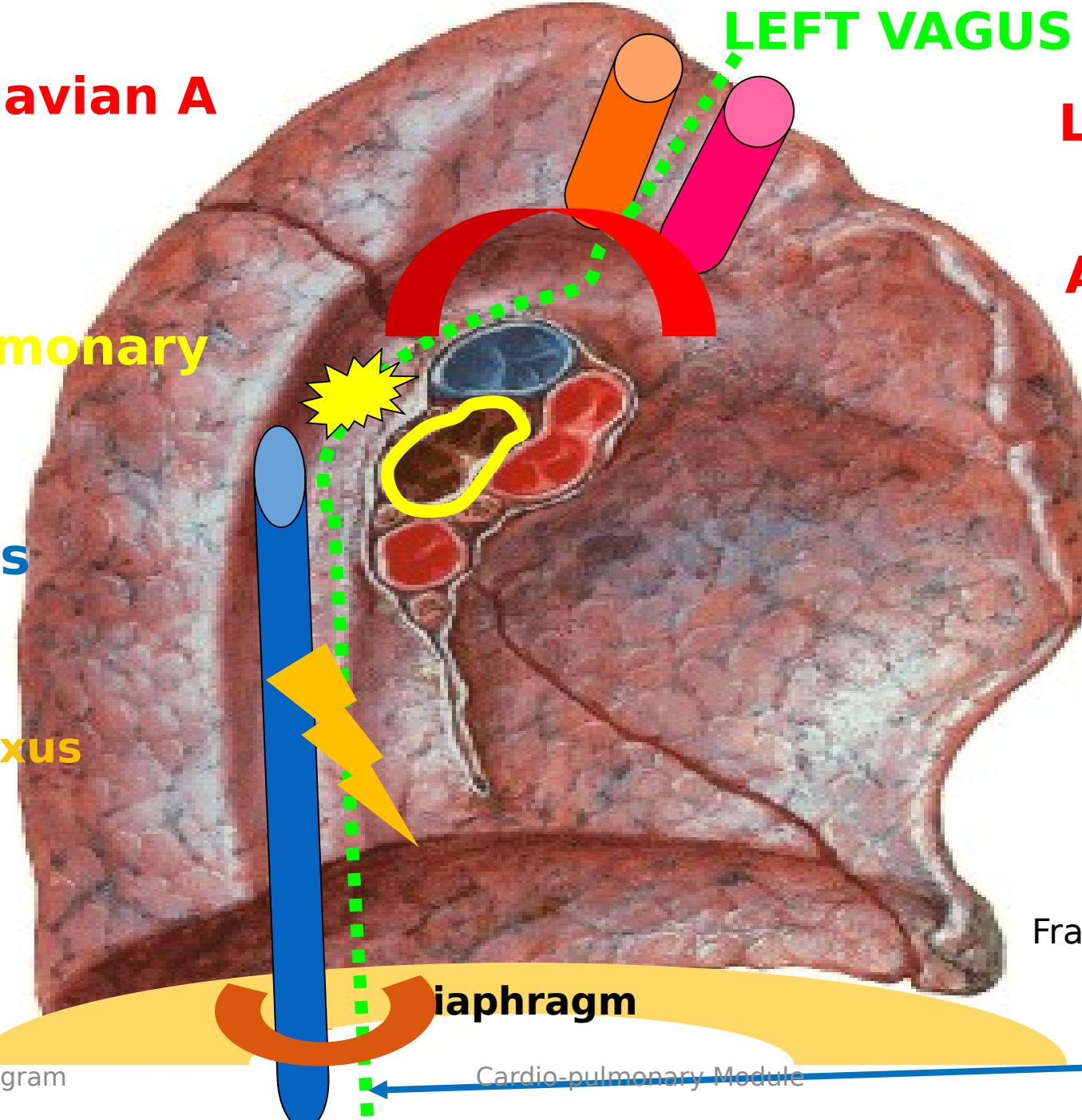


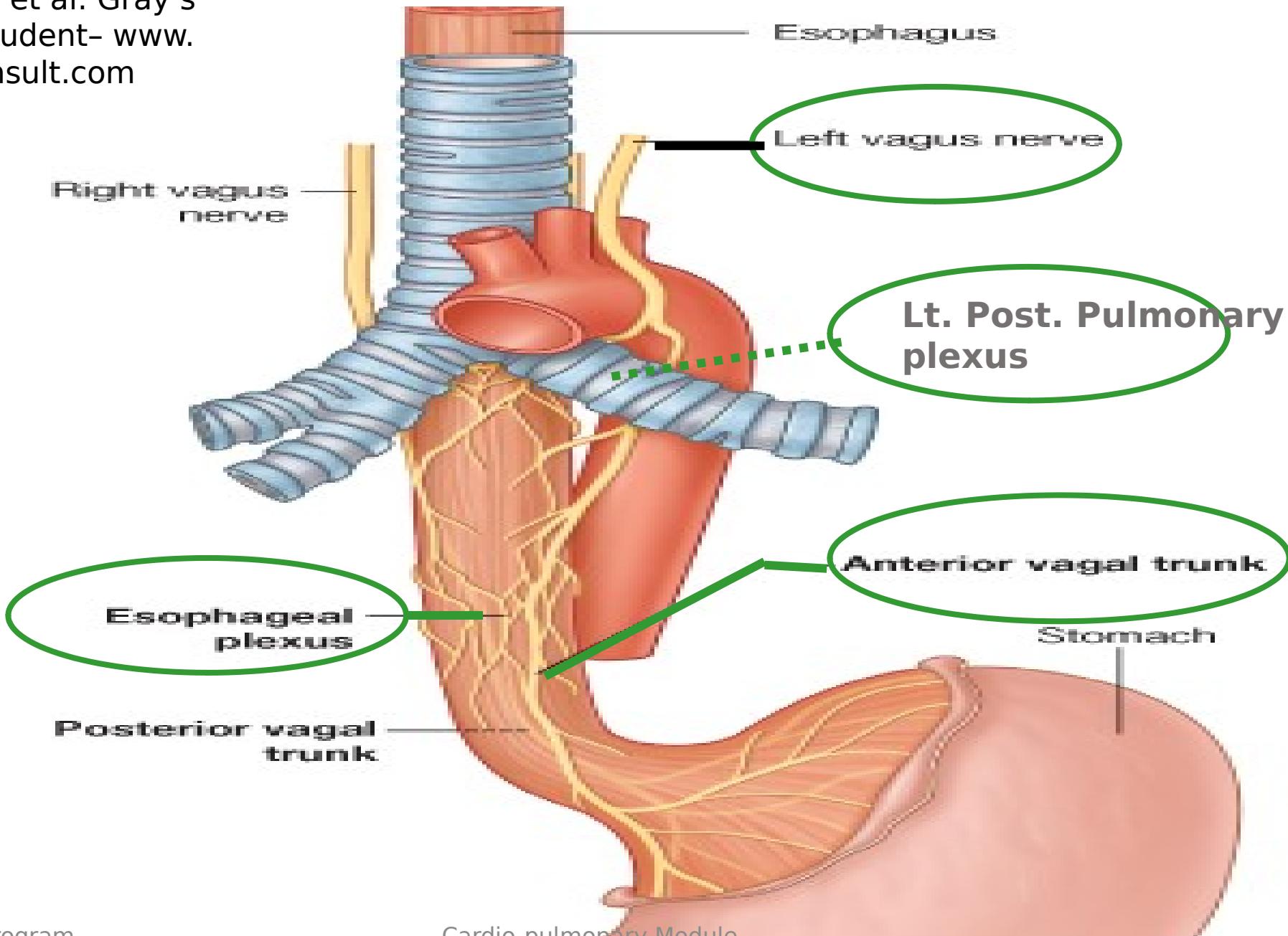
Elsevier. Drake et al: Gray's anatomy for student- [www.studentconsult.com](http://www.studentconsult.com)



# Left vagus nerve

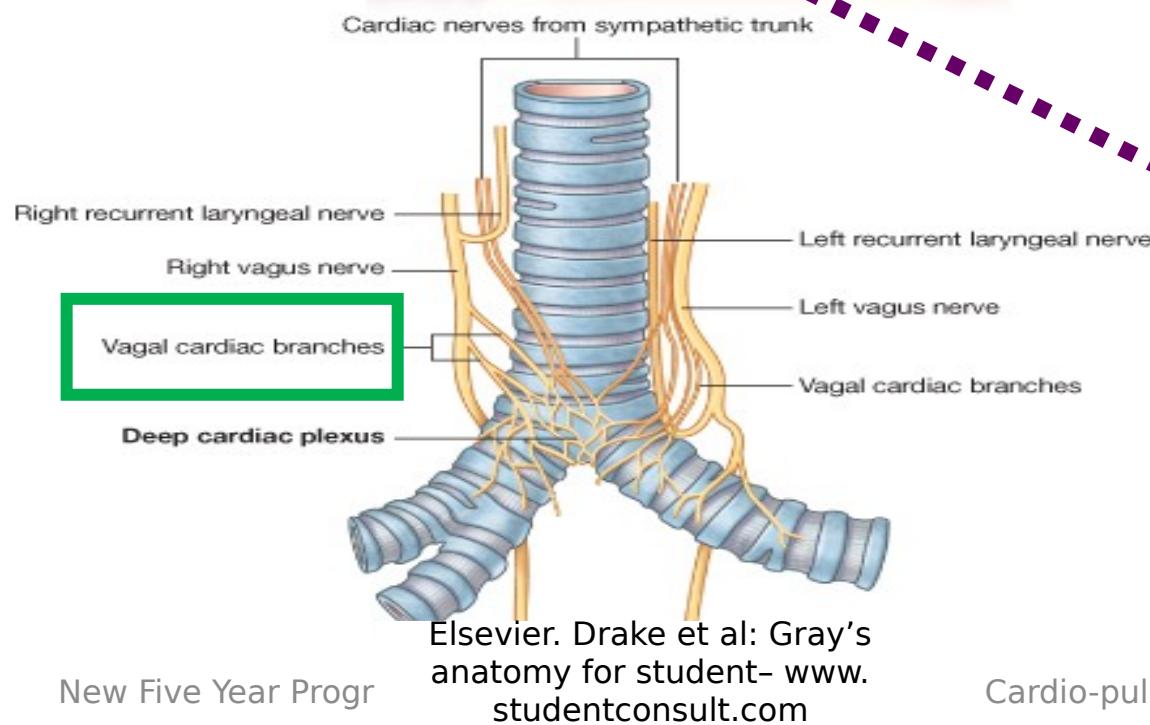
- Passes between **left common carotid** & **left subclavian arteries**
- Above root of lung  $\square$  descends on left side of **aortic arch**
- Behind the left bronchus *where it forms* **left posterior pulmonary plexus**
- Below root of lung  $\square$  descends in front of **esophagus** *where it forms* **esophageal plexus**
- Passes through **esophageal opening** in **diaphragm**  $\square$  ant. to the stomach, *therefore called* **anterior gastric nerve**



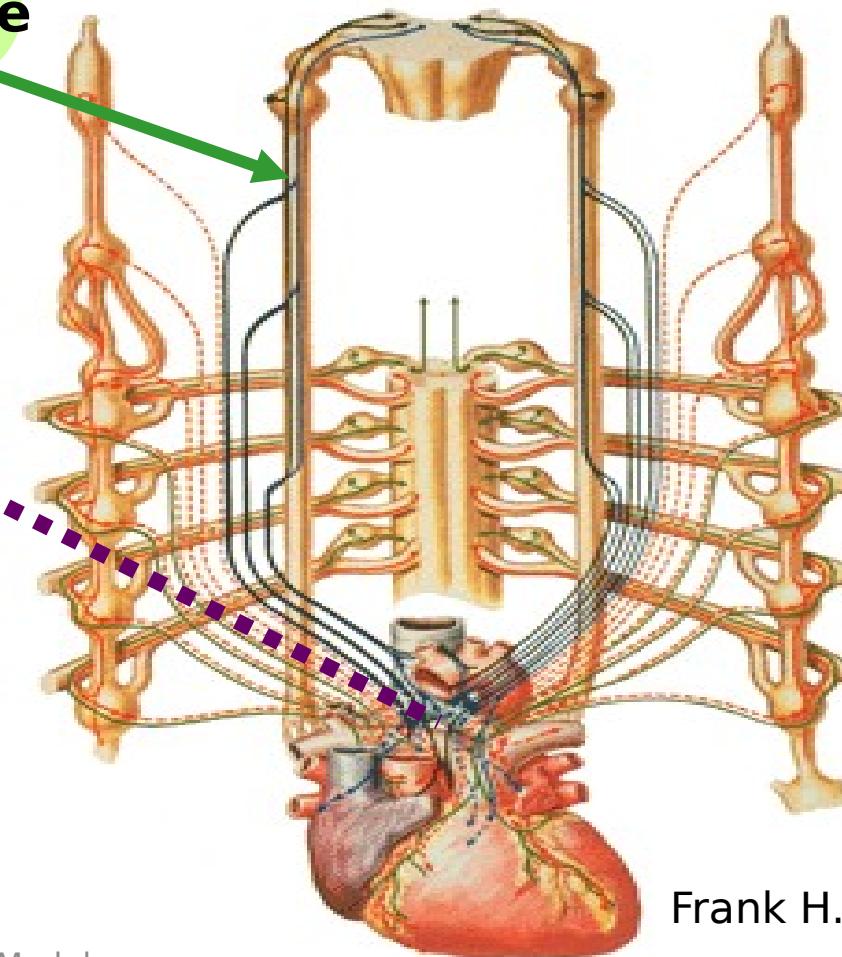


# Branches of the vagi in the thorax

## 1. Cardiac branches □ cardiac plexus



Innervation of Heart  
Schema



Frank H. Netter, 4<sup>th</sup> ed.

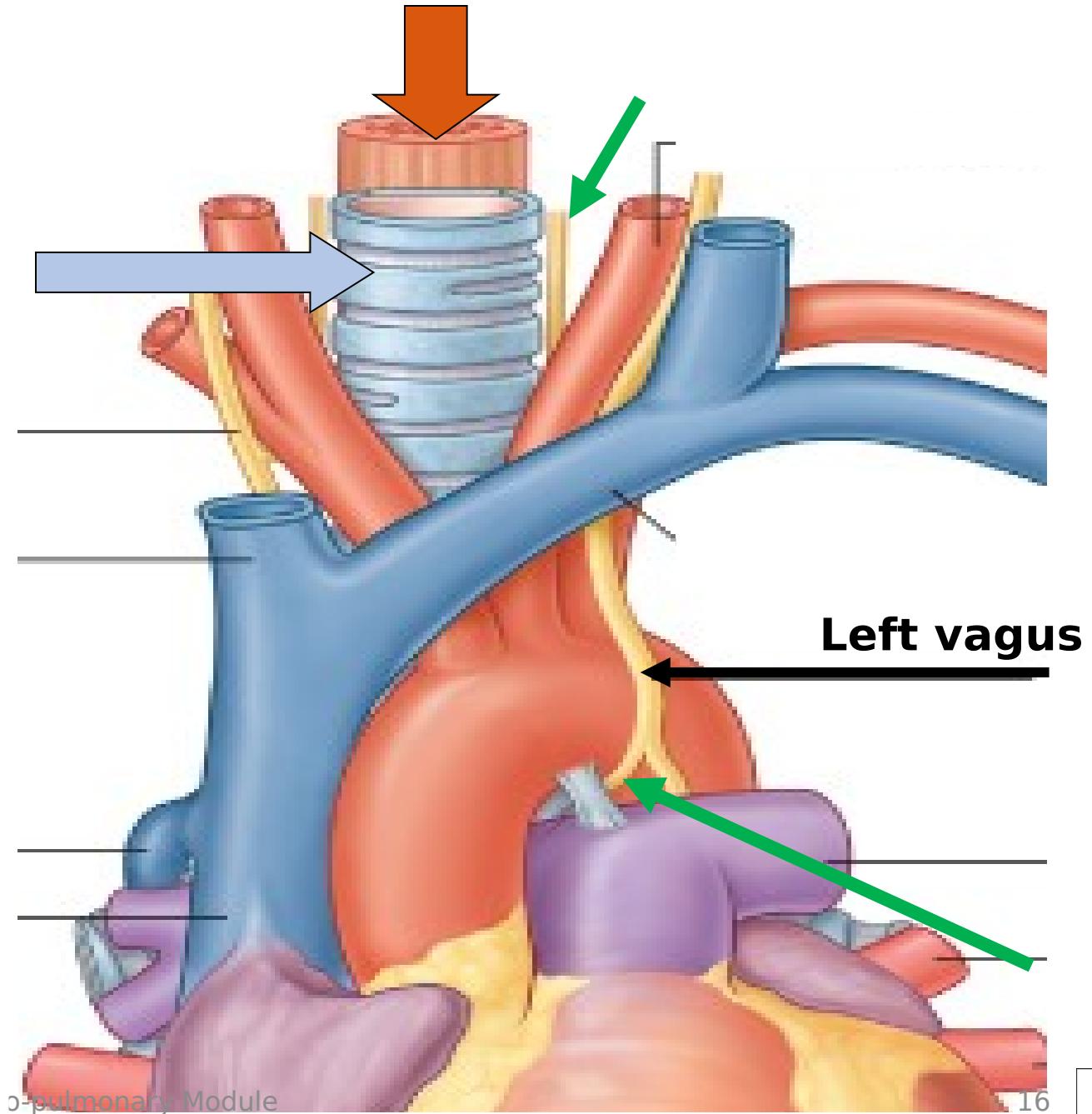
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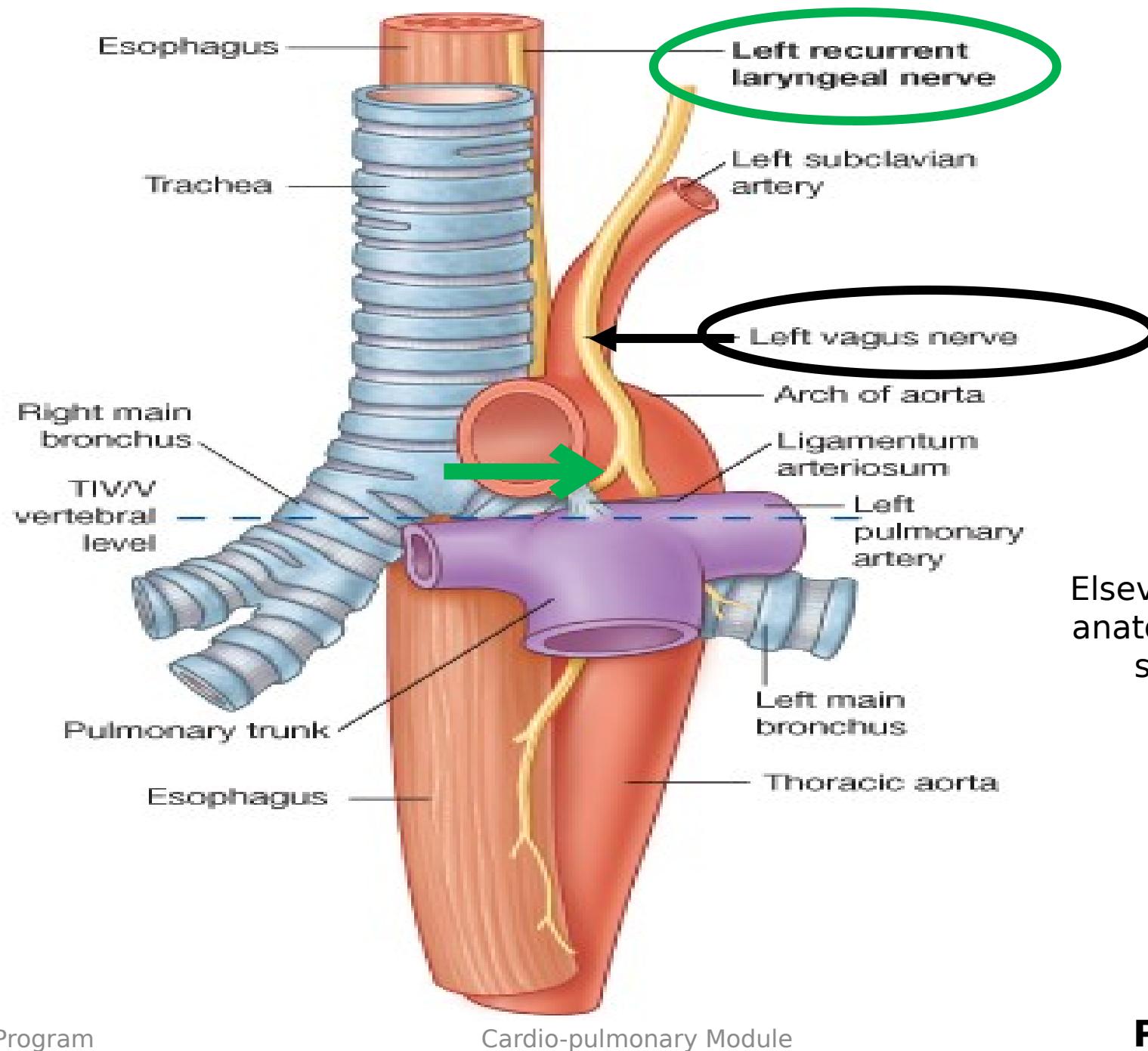
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**2. Left recurrent laryngeal nerve arises from left vagus in superior mediastinum as it crosses arch of aorta. It curves below aortic arch & ascends in groove between trachea & oesophagus**



Elsevier. Drake et al: Gray's anatomy for student- www.studentconsult.com



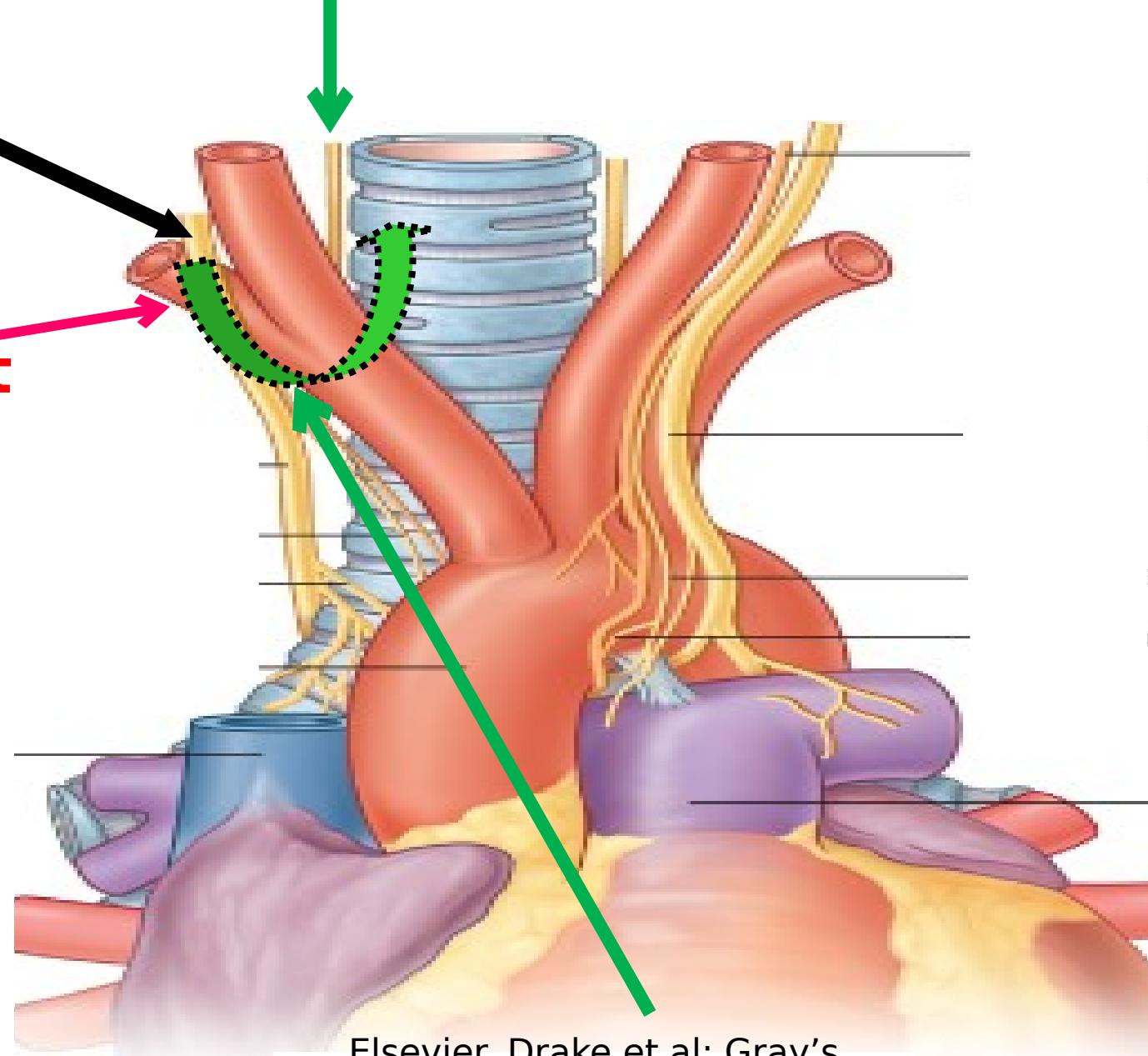
Elsevier. Drake et al: Gray's anatomy for student- www.studentconsult.com

**N.B. Right recurrent laryngeal nerve** from right vagus in the root of the neck.

It curves round the **right subclavian artery**

3. **Pulmonary plexus** (see before)

4. **Esophageal plexus** (see before)



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# Lecture Quiz



**Which statement correctly describes the left vagus nerve:**

- A. It is separated from the trachea by left common carotid artery.
- B. It passes anterior to the hilum of left lung.
- C. It passes posterior to the arch of aorta.
- D. It does not supply the oesophagus.



# Lecture Quiz Answer



**Which statement correctly describes the left vagus nerve:**

- A. It is separated from the trachea by left common carotid artery.**
- B. It passes anterior to the hilum of left lung.**
- C. It passes posterior to the arch of aorta.**
- D. It does not supply the oesophagus.**



# **THE THORACIC PART OF THE SYMPATHETIC TRUNK**

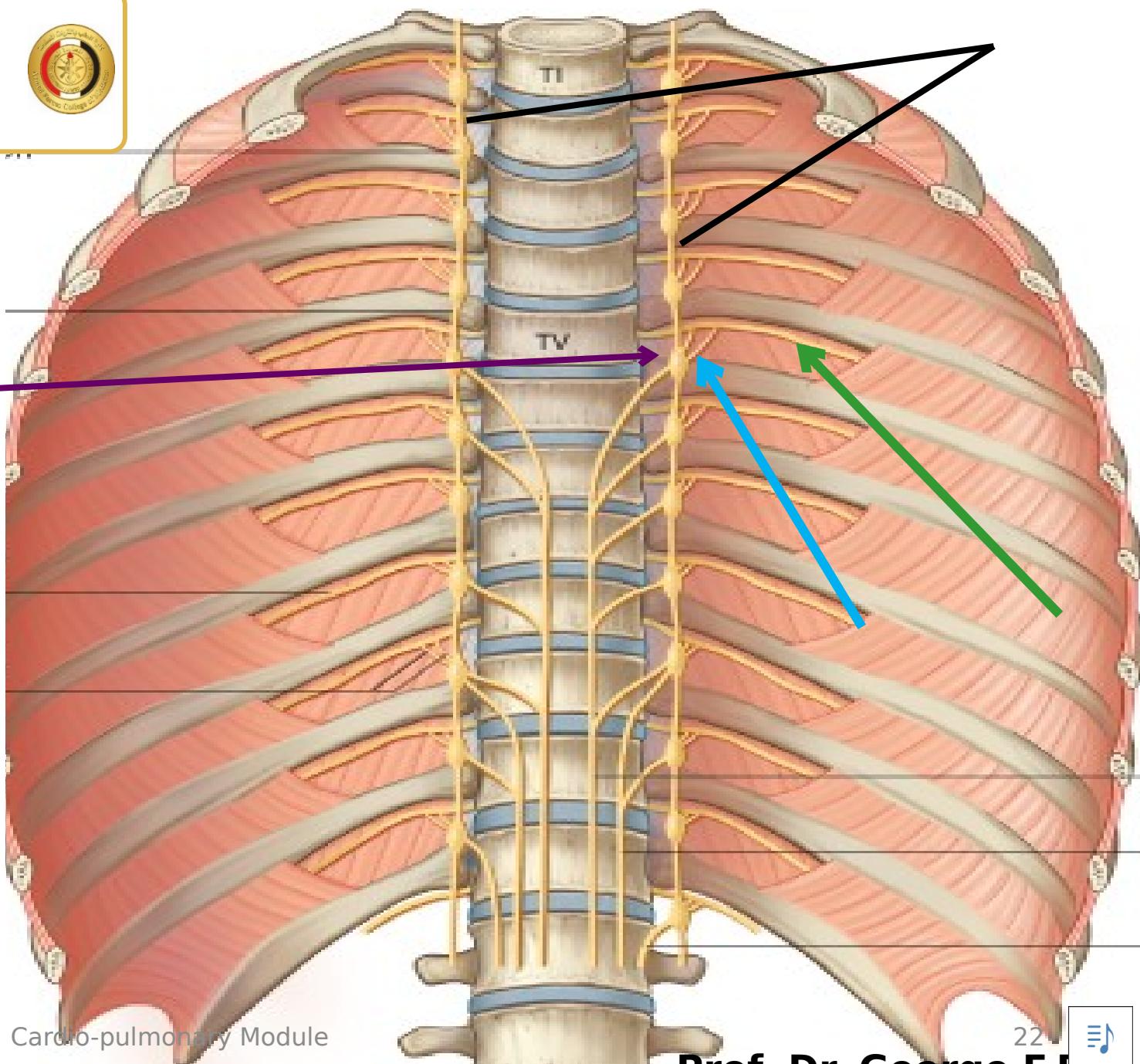


# Sympathetic chain or trunk



- **Consists of 2 parallel cords having 11 or 12 pairs of ganglia**
- **Each ganglion is connected to adjacent thoracic spinal nerve by white & gray rami communicantes**

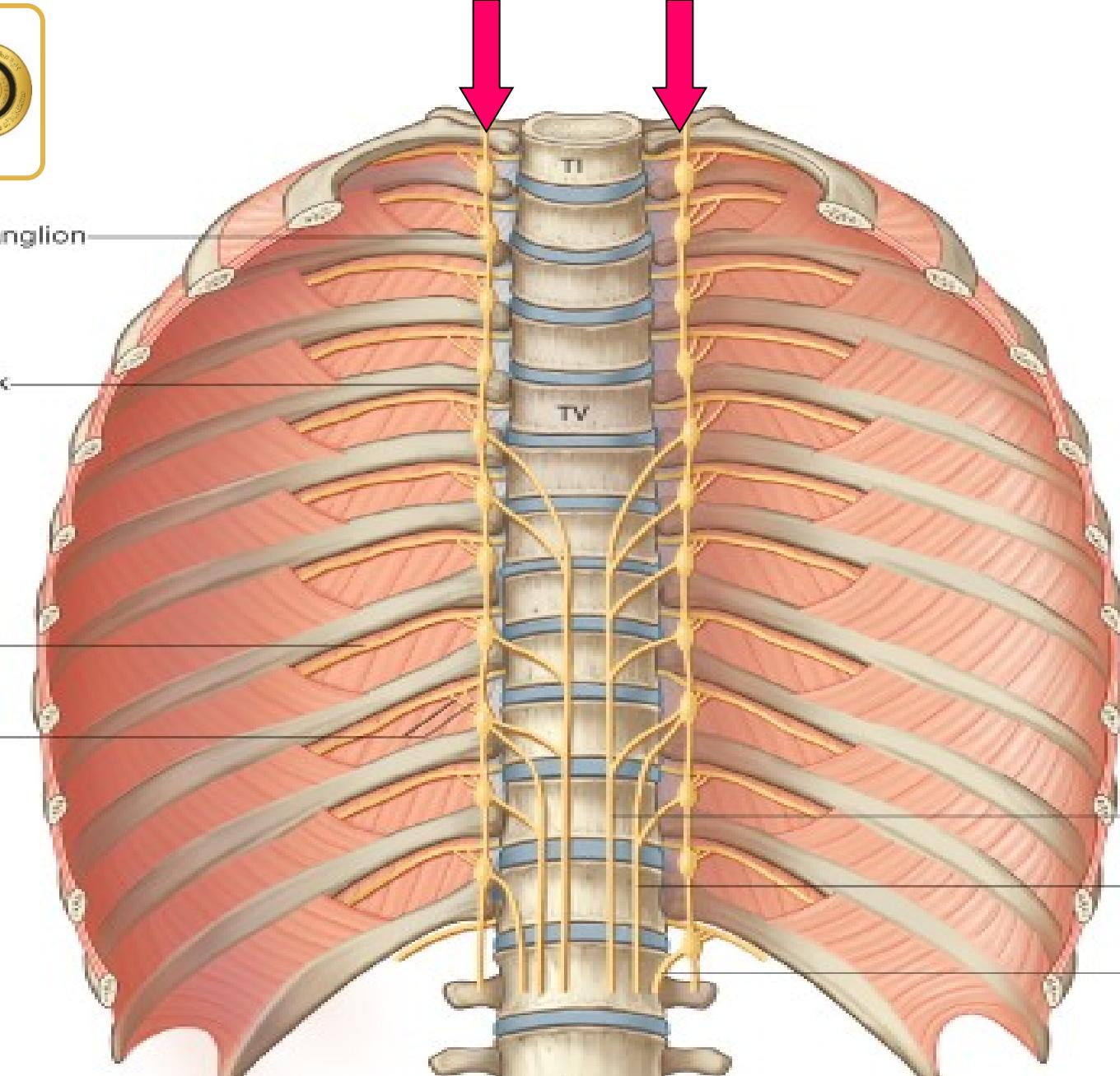
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# Sympathetic chain or trunk



- **Each sympathetic chain enters the thorax by crossing in front of the neck of 1<sup>st</sup> rib**



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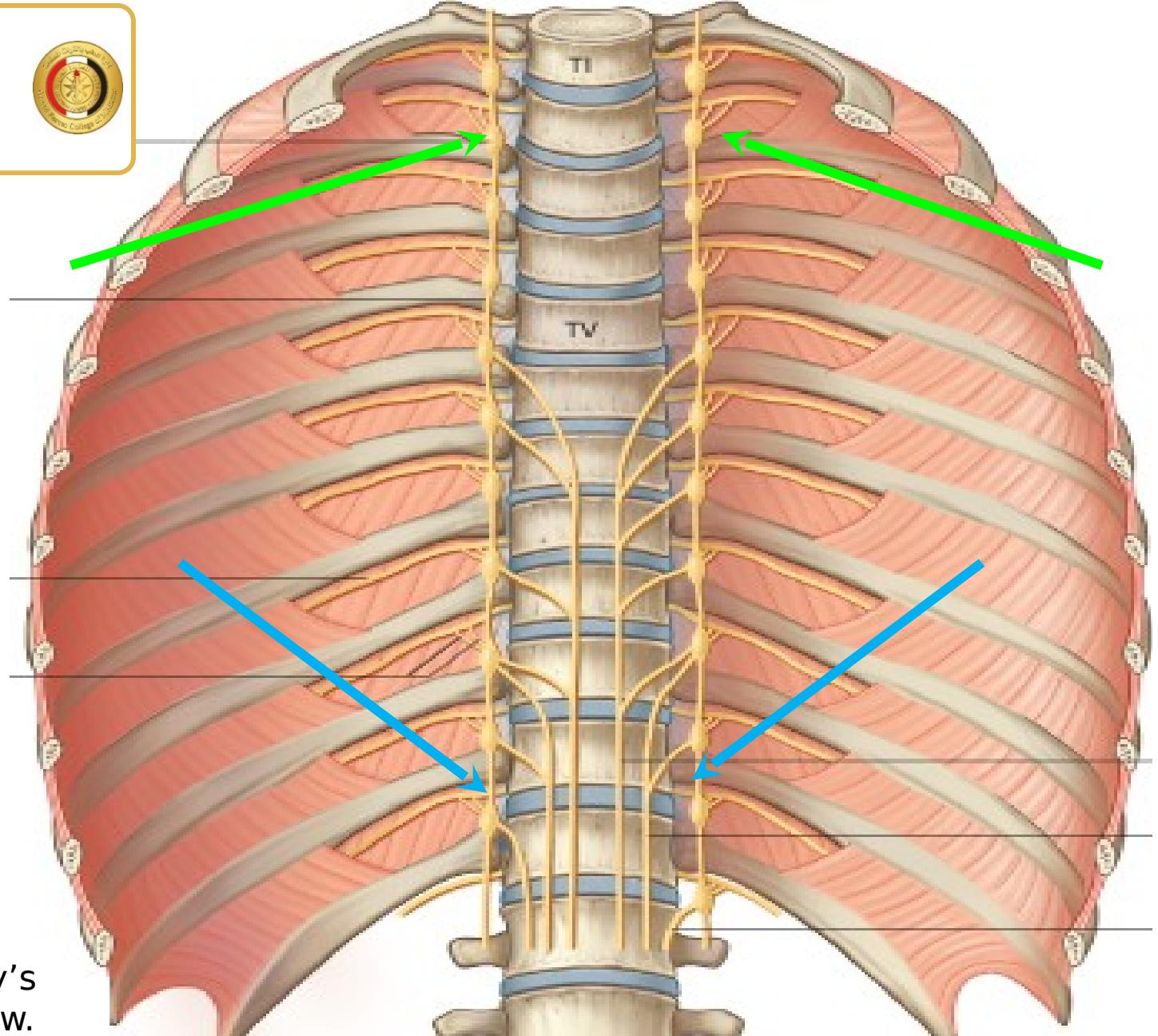


# Sympathetic chain or trunk



## •Course & relations:

- 1) In upper part of thorax, they descend in front of the necks of ribs
- 2) In the lower part of the thorax, they descend on sides of bodies of vertebrae

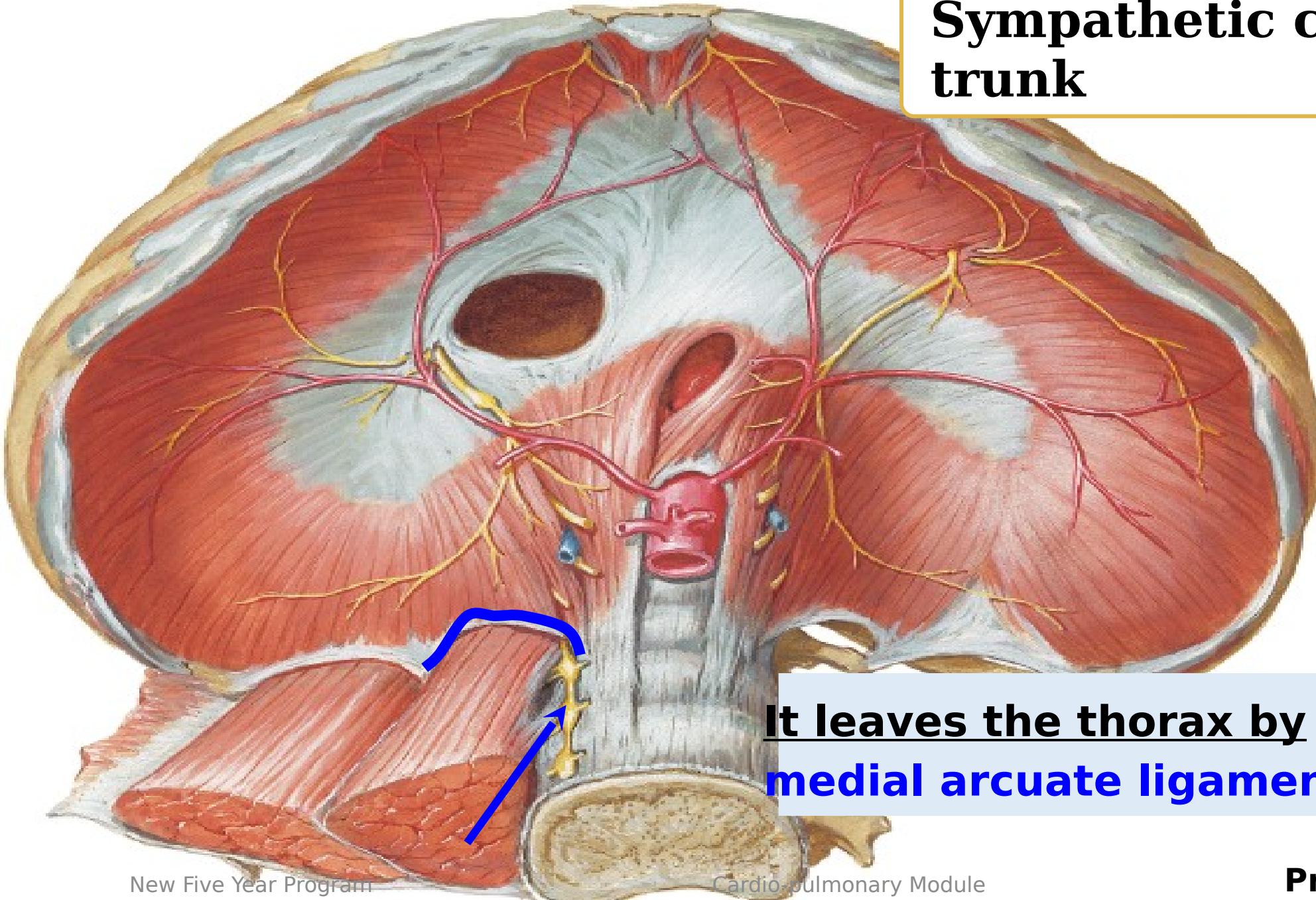


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# Sympathetic chain or trunk



Frank H. Netter, 4<sup>th</sup> ed.

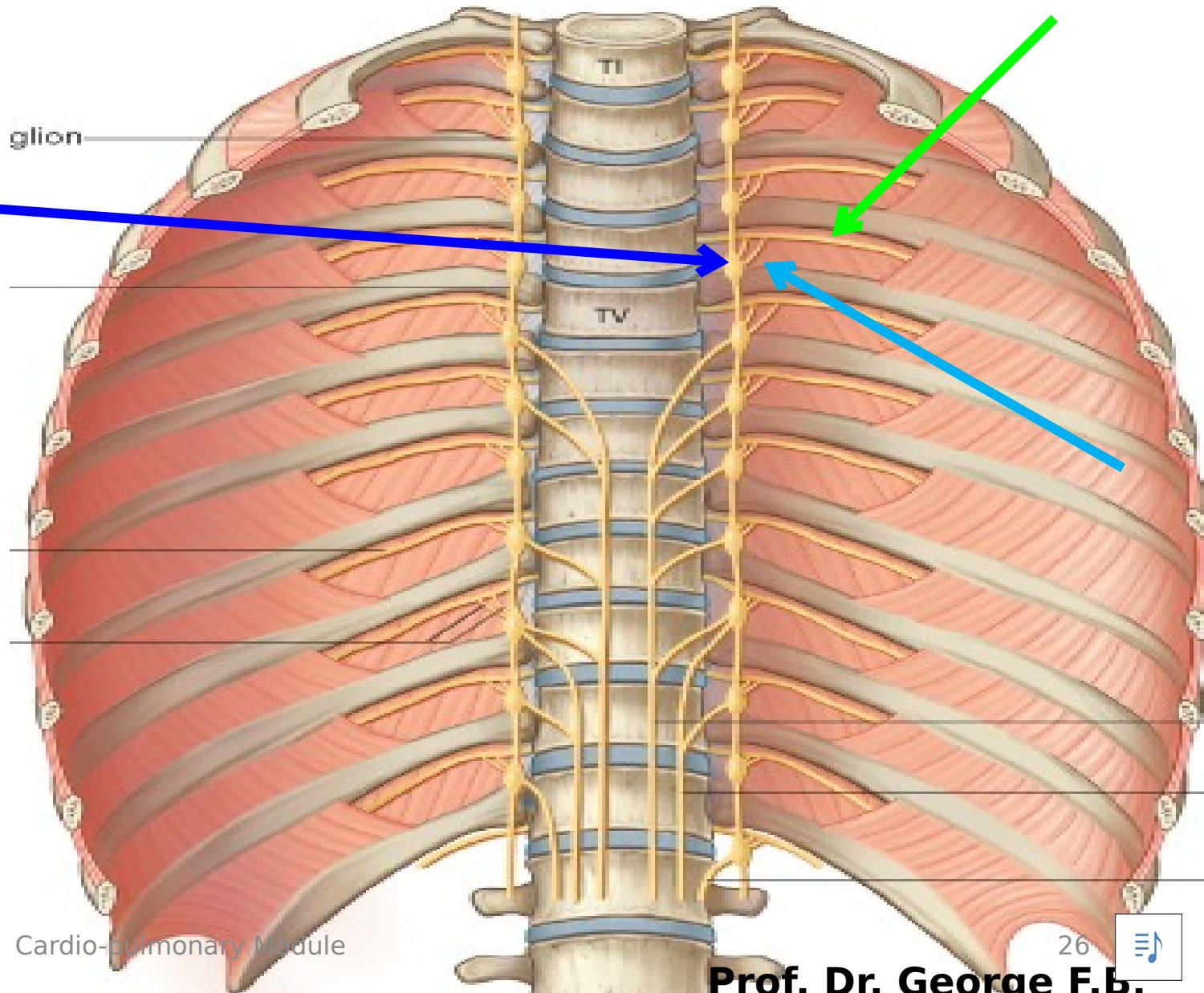
**It leaves the thorax by passing behind  
medial arcuate ligament of diaphragm**



# Branches



1. Lateral somatic communicating branches [ each ganglion is connected to the corresponding spinal nerve by white & gray rami communicantes



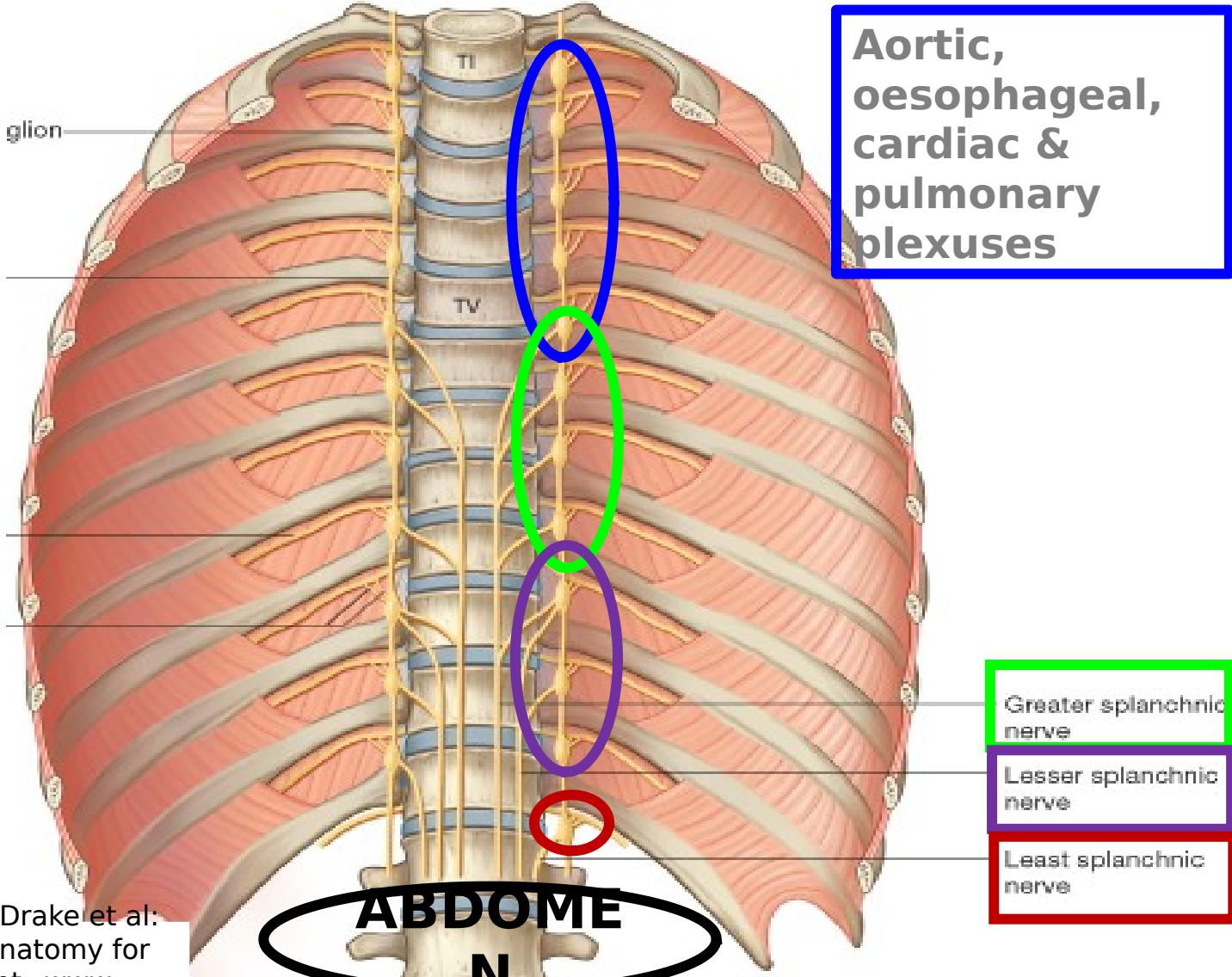
# Branches



**2. Medial visceral branches:**

- A. Upper 5 ganglia**  **fibres to aortic & oesophageal , cardiac & pulmonary plexuses.**
- B. 5<sup>th</sup> - 9<sup>th</sup> ganglia**  **greater splanchnic nerve**  **abdomen.**
- C. 9<sup>th</sup>,10<sup>th</sup> or , 10<sup>th</sup>, 11<sup>th</sup> ganglia**  **lesser splanchnic nerve**  **abdomen.**
- D. 12<sup>th</sup> ganglion**  **least splanchnic nerve**  **abdomen).**

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# Lecture Quiz



**The greater splanchnic N. is formed of branches from:**

- A. 4<sup>th</sup> to 8<sup>th</sup> thoracic sympathetic ganglia.
- B. 5<sup>th</sup> to 9<sup>th</sup> thoracic sympathetic ganglia.
- C. 3<sup>rd</sup> to 7<sup>th</sup> thoracic sympathetic ganglia.
- D. 6<sup>th</sup> to 10<sup>th</sup> thoracic sympathetic ganglia.
- E. None of the above.



# Lecture Quiz Answer



**The greater splanchnic N. is formed of branches from:**

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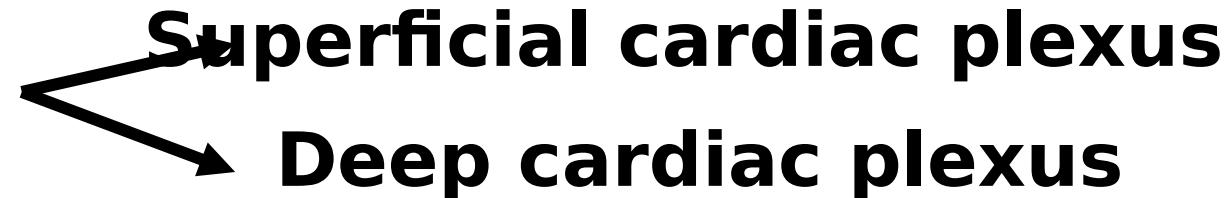
# **AUTONOMIC PLEXUSES IN THE THORAX**





# Autonomic plexuses

1. Cardiac plexus -----



2. Pulmonary plexus -----



3. Coronary plexus

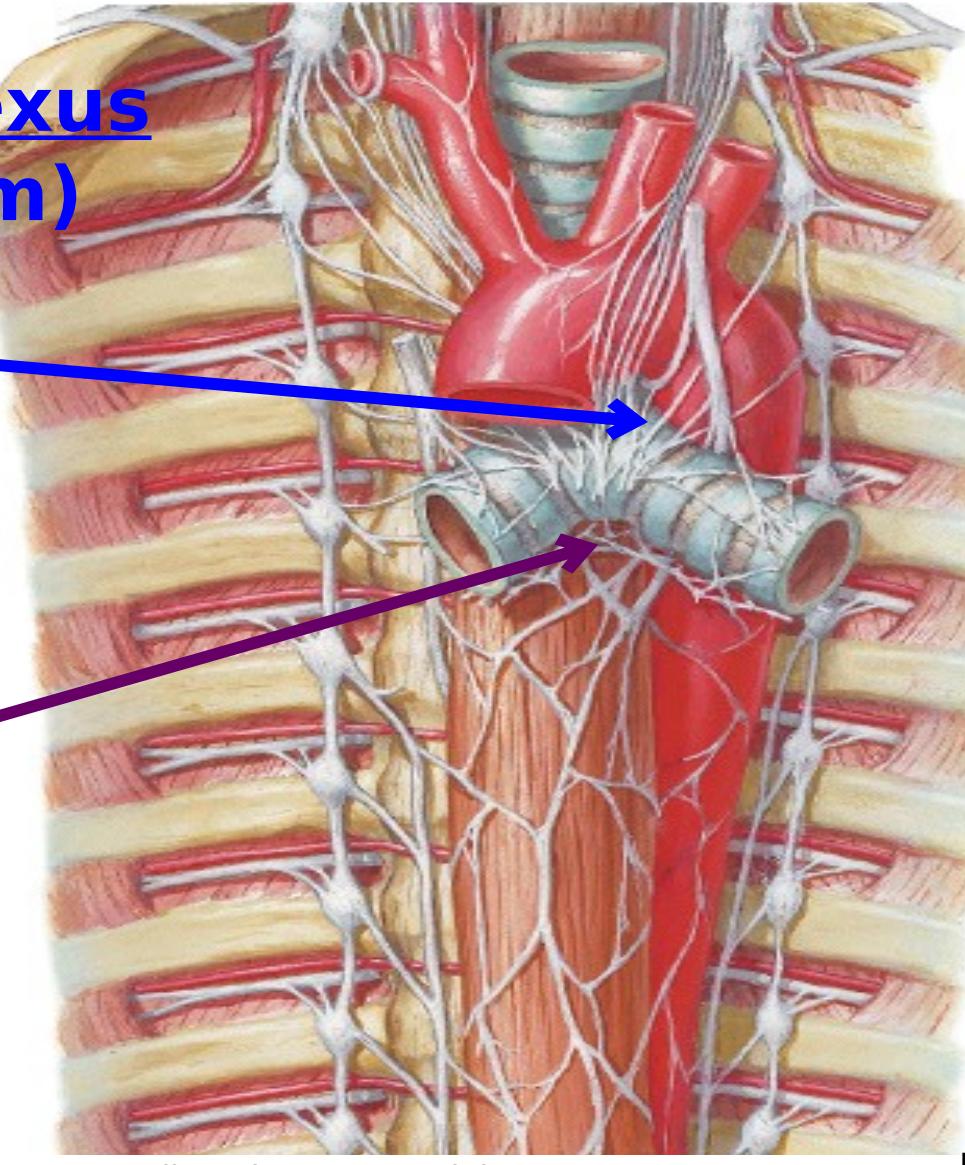




# 1. Cardiac plexuses

**Superficial cardiac plexus**  
in front of ligamentum  
(arteriosum)

**Deep cardiac plexus**  
in front of tracheal  
(bifurcation)



Frank H. Netter, 4<sup>th</sup> ed.

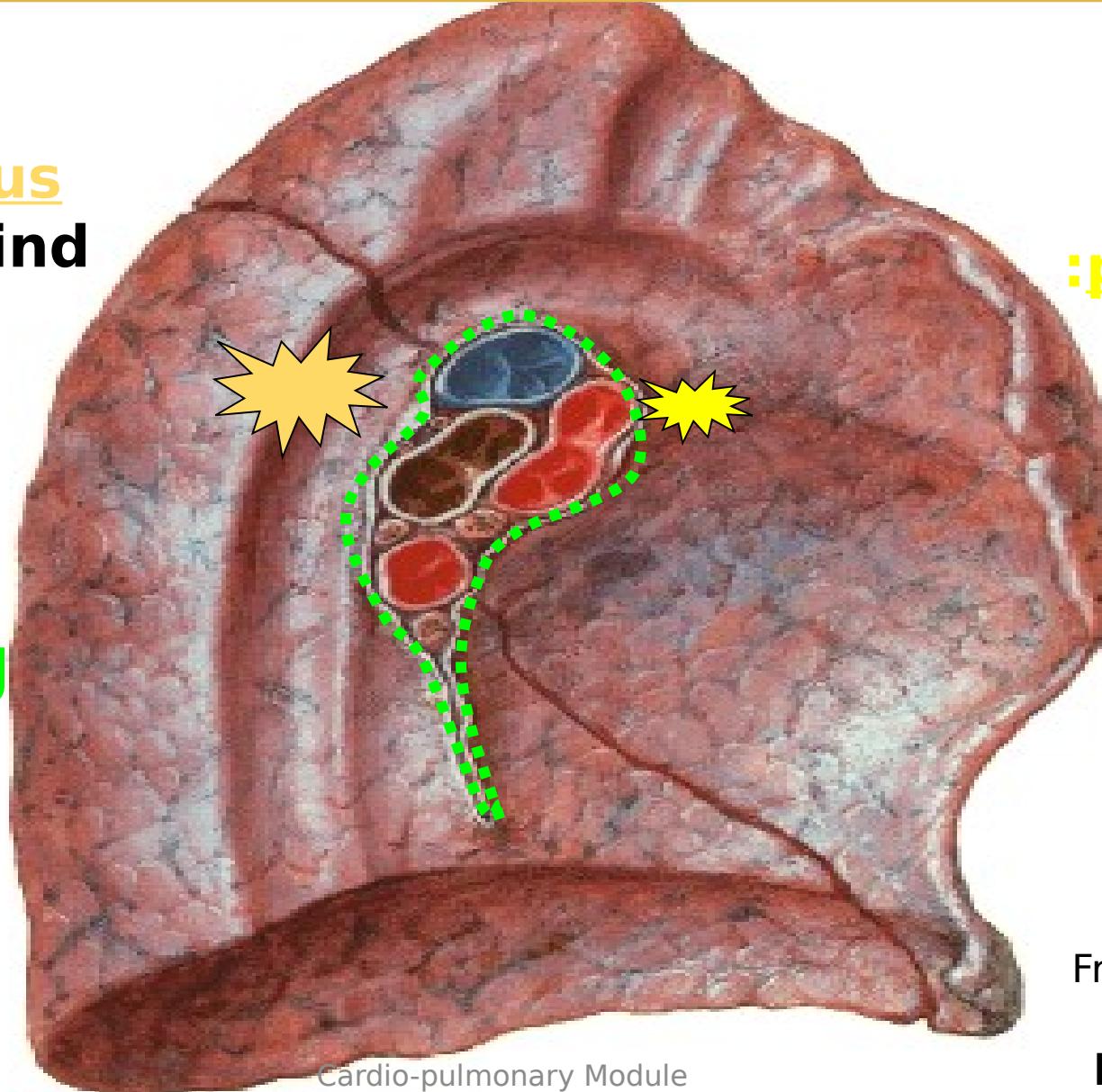




## 2. Pulmonary plexuses

Posterior  
:pulmonary plexus  
**Larger & lies behind  
root of lung**

**Root of lung**



Anterior  
:pulmonary plexus  
**Smaller & lies in  
front  
of root of lung**

Frank H. Netter, 4<sup>th</sup> ed.

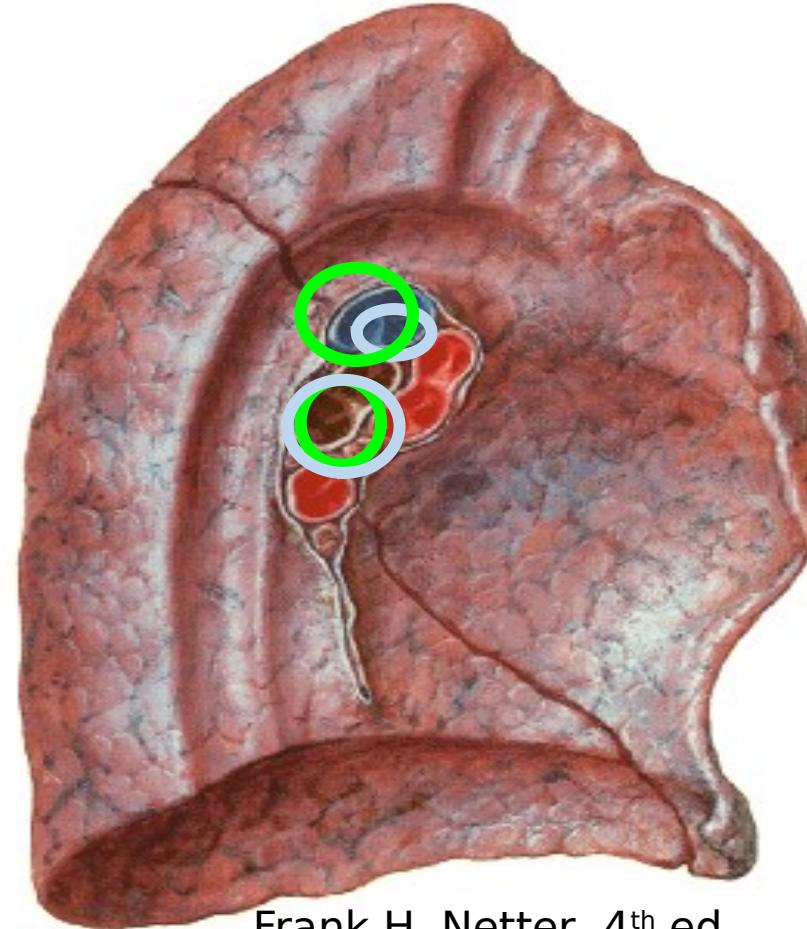
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# Distribution of pulmonary plexus

The plexus forms a network of fibers around the bronchial tree & pulmonary vessel

**Vagal fibers** □  
bronchoconstrictor, secretory to glands & vasodilators



Frank H. Netter, 4<sup>th</sup> ed.

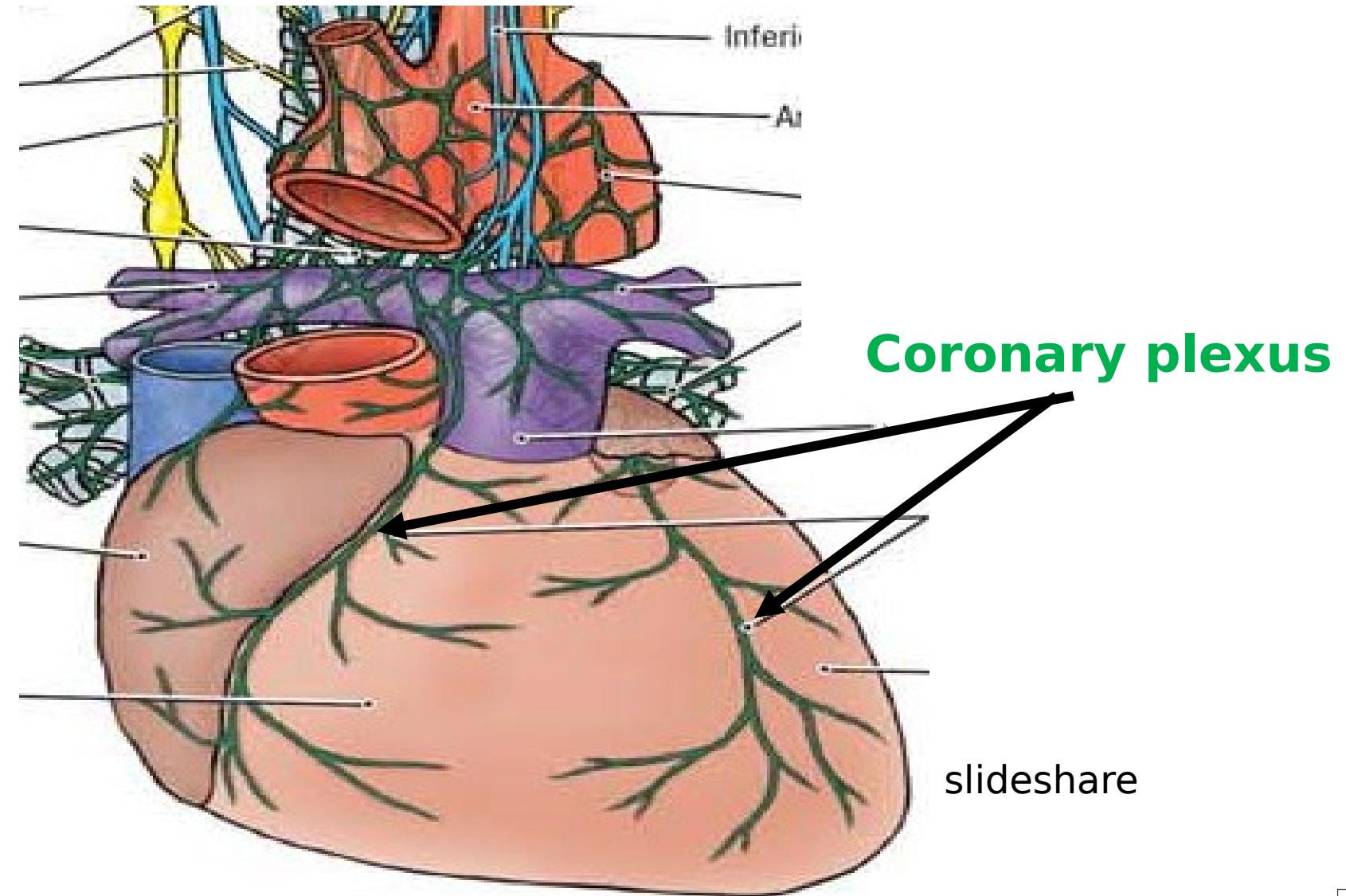
**Sympathetic fibers** □  
bronchodilators & vasoconstrictors





### 3. Coronary plexus

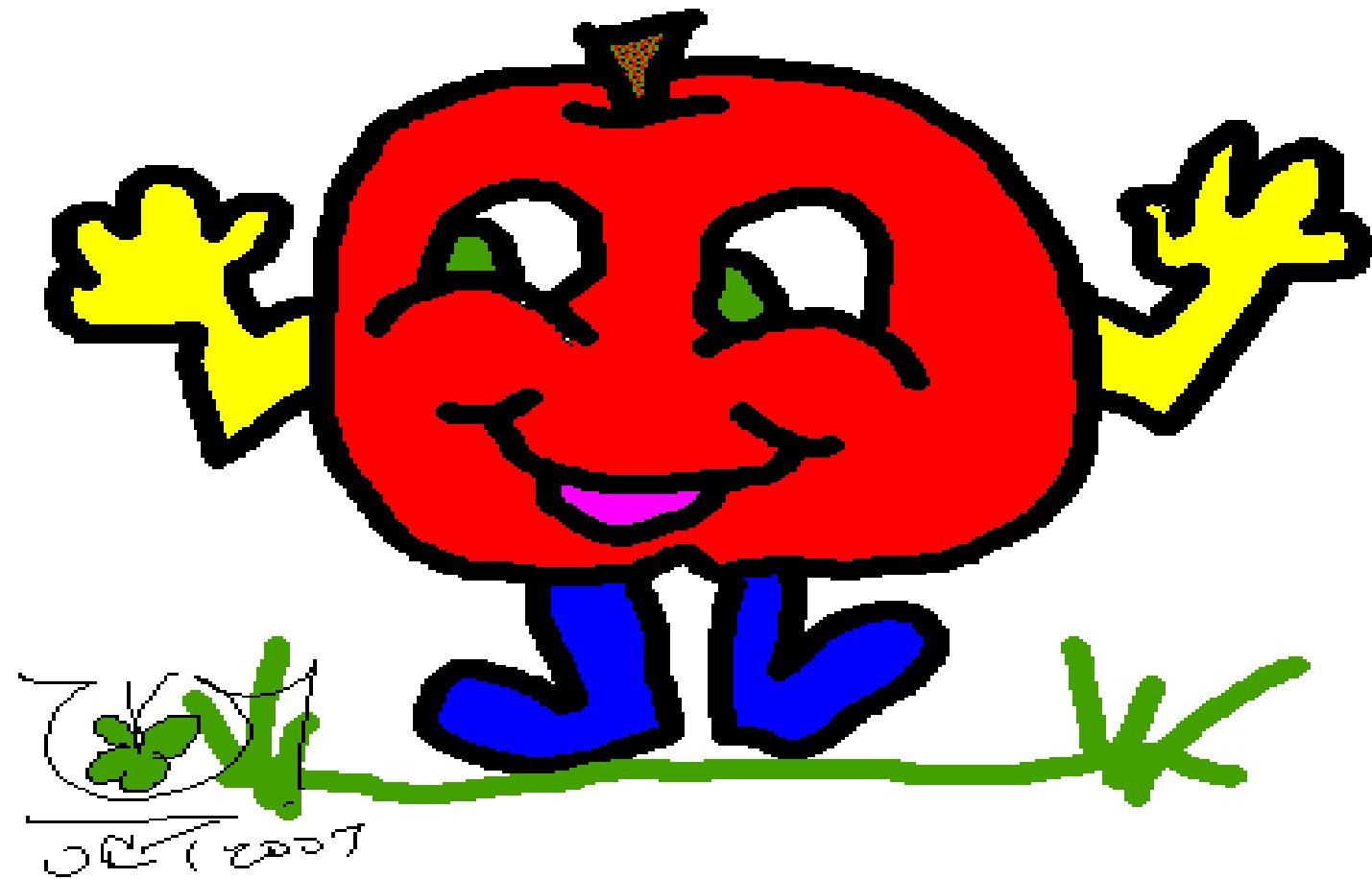
**Autonomic plexuses accompanying the coronary arteries and their branches. They are formed by branches of the cardiac plexus**



# SUGGESTED TEXTBOOKS



*Snell, Clinical Anatomy, 7<sup>th</sup> edition, p. 88, 99-100.*



**THANK YOU**

Prof. Dr. George F.I.  
Hanna

